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Signed P. Mahoney

Dated 17 October 2000

Patents Form 1/77

The Patent Office

Request for grant of a patent

The Patent Office
Cardiff Road
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1	Your reference	MRH/P15832
2	Patent application number	11 OCT 1999 **9923959.2**
3	Full name, address and postcode of the applicant Patents ADP number State of incorporation	Innovata Biomed Limited The Ziggurat Grosvenor Road ST ALBANS AL1 3HW UK 04713000 6 ✓
4	Title of the invention	INHALER
5	Name of agent Address for service Patents ADP number	Harrison Goddard Foote Belmont House 20 Wood Lane Headingley Leeds LS6 2AE 1557100 ✓

6	Priority applications	Country	Priority App No	Date of Filing

Patents Form 1/77

7	Parent application (eg Divisional)	Earlier Application No	Date of Filing
8	Statement of Inventorship Needed?		
9	Number of sheets for any of the following (not counting copies of same document)		
	Continuation sheets of this form		
	Description	3	
	Claims		
	Abstract		
	Drawings		
10	Number of other documents attached		
	Priority documents		
	Translations of priority documents		
	P7/77		
	P9/77		
	P10/77		
	Other documents		
11	I/We request the grant of a patent on the basis of this application.		
	Signature Harrison Goddard Foote Date 11 Oct 1999		
12	Name and daytime telephone number of person to contact in the United Kingdom	Michael R Harrison +44 113 2258350	

INHALER

FIELD OF THE INVENTION

This invention relates to inhalers, which are devices for use in delivering a dose of medicament or other substance for inhaling into the lungs.

BACKGROUND OF THE INVENTION

Inhalers make use of medicament in a finally divided powder form. The powder may be located within the inhaler, for instance, in a single storage compartment or in a plurality of single dose locations.

Another form of inhaler may make use of medicament powder which is located within a frangible, plastic capsule. In use, the capsule is inserted into the inhaler and operation of the inhaler ruptures from the plastic capsule so that the powder may be extracted from the capsule and inhaled by the user.

A problem encountered with all inhalers making use of powdered medicament is that, if moisture comes into contact with the powder, it will tend to make it less free-flowing and therefore render the operation of the inhaler less effective because the correct dose of powder cannot be fully inhaled.

Moisture may access the powder via several different mechanisms. These include the passage of the moisture through the plastic wall of encapsulated powder for those inhalers which make use of capsules loaded with medicament powder. For those inhalers which include a storage compartment loaded with powder and from which a dose of powder is accessed by some form of moving part within the inhaler and then presented to an air passageway for inhalation, moisture can access powder within the storage compartment by finding its way along a gap or gaps between the moving parts. In some inhalers there is the possibility of a "wick" type path being established between the powder in a storage compartment within the inhaler and a location within the inhaler where a dose of medicament is located.

With inhalers where a plurality of single doses of medicament is located within the inhaler, there is again likely to be one or more moving parts, providing gaps along which moisture may travel to access each individual dose of medicament.

It is also possible that moisture can pass through the plastic walls of inhalers and reach the powder contained within the inhaler whether in a single storage compartment or in individual dosage locations.

STATEMENTS OF INVENTION

The present invention provides an inhaler for delivering a substance in a finally divided form, the inhaler including a surface or surfaces provided with a moisture resistance coating.

The moisture resistance coating may be provided on one or more external or internal surfaces of the body of the inhaler. Particularly in the case of an inhaler making use of encapsulated powder, the moisture resistance coating may be applied to the outer and/or inner surface of the capsule, although other surfaces of the body of the inhaler may also be provided with a moisture resistant coating.

The moisture resistant coating may be in the form of any material which is effective to prevent moisture accessing the powder. Typically, it may be applied to those surfaces between which there may be a gap due to relative movement between the surfaces when the inhaler is in use. However, the moisture resistant coating may be applied additionally or alternatively to other surfaces including the whole or part of the external surface of the inhaler in order to prevent moisture passing into the interior of the inhaler through the walls thereof.

The moisture resisting coating should, of course be sufficiently stable and robust so that damage to the coating during use of the inhaler is avoided.

DETAILED DESCRIPTION OF THE INVENTION

Moisture resistant coatings which may be used in the present invention may now be described, by way of examples only.

Polymers of poly-para-xylylenes are known as parylene. This material is a conformal polymer film which has been used in a number of applications, including electronics circuits and sensors, where environmental and dielectric isolation is required.

Parylenes are thermoplastic polymers that are capable of polymerising on surfaces from an active monomer gas, without the presence of a liquid. The process is capable of producing very thin layers of polymer and, indeed, a layer of from 10 to 20 microns may be sufficient to protect inhalers and their parts, from ingress of moisture.

The polymerisation process takes place at room temperature without solvents and additives. Since the parylene is applied as a gas it conforms to the topography of the surface which it contacts. Since the position does not involve a liquid phase, there is no pooling and bridging during application. The coating is free of pinholes even if the coating has a thickness of less than one micron. As well as being resistant again moisture, parylene is also resistant against other media including hydrocarbons, acids and blood.

The coating may be applied in a single vacuum-coating operation in a thickness from 0.025 to 75 microns and can be controlled accurately to ± 10% of the final thickness.